

What is claimed is:

1. A device comprising:
 - a substrate having active and non-active regions;
 - 5 an active component in the active region;
 - a cap support in a periphery of the device and in the non-active region;
 - a cap on the cap support; and
 - a cavity between the active component and the cap.
- 10 2. The device of claim 1 wherein the device comprises an organic LED (OLED) device which includes OLED pixels as the active component.
- 15 3. The device of claim 2 wherein the device comprises a flexible device.
4. The device of claim 3 wherein the cap comprises a flexible cap which encapsulates the device to
- 20 hermetically seal the active component.
5. The device of claim 4 wherein the cap comprises a material selected from the group consisting of glass, metal, ceramic, or metallized foil.

6. The device of claim 5 wherein the substrate comprises a flexible substrate which provides mechanical integrity to support the active component.

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7. The device of claim wherein 6 the flexible substrate comprises plastic, glass, or semiconductor material.

10 8. The device of claim 7 wherein the substrate comprises a thickness of about 20 - 300 um.

9. The device of claim 4 wherein the substrate comprises a flexible substrate which provides mechanical
15 integrity to support the active component.

10. The device of claim 2 wherein the cap encapsulates the device to hermetically seal the active component.

20 11. The device of claim 10 wherein the substrate provides mechanical integrity to support the active component.

12. The device of claim 3 wherein the cap encapsulates the device to hermetically seal the active component.

13. The device of claim 12 wherein the substrate
5 provides mechanical integrity to support the active component.

14. The device of claim 1 wherein the device comprises a flexible device.

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15. The device of claim 14 wherein the cap comprises a flexible cap which encapsulates the device to hermetically seal the active component.

15 16. The device of claim 15 wherein the substrate comprises a flexible substrate which provides mechanical integrity to support the active component.

17. The device of claim 1 wherein the cap encapsulates
20 the device to hermetically seal the active component.

18. The device of claim 17 wherein the substrate provides mechanical integrity to support the active component.

19. The device of claim 1 wherein the substrate provides mechanical integrity to support the active component.

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20. The device of claim 1, 2, 3, 6, 7, 9, 11, 13, 14, 16, 17, or 19 wherein the cap support comprises a thickness greater than a height of the active component to form the cavity between the cover and the active component to prevent the cover from contacting the active component.

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21. The device of claim 20 wherein the thickness of the cap support produces a cavity height of about 1 - 10 um.

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22. The device of claim 21 wherein the support posts comprises directly or indirectly photopatternable material.

20 23. The device of claim 22 wherein the directly photopatternable material is selected from a group consisting of photosensitive polyimide, photosensitive polybenzoxazole, photoresists, photoresists based on novolac systems, or dry film resist materials and the

indirectly photopatternable material is selected from the group consisting of spin-on glass, polyimide, polybenzoxazole, polyglutarimide, benzocyclobutene, polymers, polyethylene, polystyrene, polypropylene, inorganic materials, SiO_2 , Si_3N_4 , or Al_2O_3 .

24. The device of claim 20 wherein the support posts comprises directly or indirectly photopatternable material.

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25. The device of claim 24 wherein the directly photopatternable material is selected from a group consisting of photosensitive polyimide, photosensitive polybenzoxazole, photoresists, photoresists based on novolac systems, or dry film resist materials and the indirectly photopatternable material is selected from the group consisting of spin-on glass, polyimide, polybenzoxazole, polyglutarimide, benzocyclobutene, polymers, polyethylene, polystyrene, polypropylene, inorganic materials, SiO_2 , Si_3N_4 , or Al_2O_3 .

26. The device of claim 20 wherein the cap support comprises a multi-layer architecture having at least first and second support layers.

27. The device of claim 26 wherein the first layer comprises a dielectric material to provide electrical isolation for the active component.

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28. The device of claim 27 wherein the first and second support layers comprise directly or indirectly photopatternable material.

10 29. The device of claim 26 wherein the first and second support layers comprise directly or indirectly photopatternable material.

30. A method for fabricating a device comprising:
15 providing a substrate;
defining active and non-active regions on the substrate;

encapsulating the device with a cap supported by a cap support, the cap support located in the non-active
20 region and in a periphery of the device.

31. The method of claim 30 wherein the device comprises an organic LED (OLED) which includes OLED pixels as the active component.

32. The method of claim 31 wherein the OLED device comprises a flexible OLED device.

5 33. The method of claim 30 wherein the device comprises a flexible device.

34. The method of claim 30, 31, 32, or 33 wherein the cap includes the cap support.

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35. The method of claim 34 wherein the cap support produces a cavity between the active component and the cap which prevents the cap from contacting the active component.

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36. The method of claim 35 wherein encapsulating the device hermetically seals the active component.

37. The method of claim 31 or 32 further comprises
20 forming the cap support.

38. The method of claim 37 wherein forming the cap support comprises:

forming a spacer layer over the substrate; and

patterning the spacer layer to form the cap support.

39. The method of claim 38 further comprises forming
5 the active component in the active region prior to or
after forming the cap support.

40. The method of claim 39 wherein forming the active
component comprises:

10 forming a first electrode layer on the substrate;
patterning the first electrode layer to form first
electrodes;

forming at least one organic layer over the
electrodes;

15 forming a second electrode layer over the organic
layer; and

patterning the second electrode layer to form
second electrodes over the organic layer.

20 41. The method of claim 40 wherein encapsulating the
device comprises mounting the cap on the cap support to
hermetically seal the device.

42. The method of claim 37 further comprises forming the active component in the active region prior to or after forming the cap support.

5 43. The method of claim 42 wherein encapsulating the device comprises mounting the cap on the cap support to hermetically seal the device.

44. The method of claim 31 or 32 further comprises:
10 forming a first electrode layer over the substrate;
patterning the first electrode layer to form first electrodes of the OLED pixels.

45. The method of claim 44 further includes forming the
15 cap support comprising:

forming a spacer layer over the substrate and first electrodes; and

patterning the spacer layer to form the cap support.

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46. The method of claim 45 further comprises forming the active component in the active region prior to or after forming the cap support.

47. The method of claim 46 wherein forming the active component comprises:

forming at least one organic layer over the first electrodes;

5 forming a second electrode layer over the organic layer; and

patterning the second electrode layer to form second electrodes over the organic layer.

10 48. The method of claim 47 wherein encapsulating the device comprises mounting the cap on the cap support to hermetically seal the device.

49. The method of claim 45 wherein encapsulating the
15 device comprises mounting the cap on the cap support to hermetically seal the device.

50. The method of claim 46 wherein encapsulating the device comprises mounting the cap on the cap support to
20 hermetically seal the device.

51. The method of claim 30 or 33 further comprises forming the cap support.

52. The method of claim 51 wherein forming the cap support comprises:

forming a spacer layer over the substrate; and
patterning the spacer layer to form the cap

5 support.

53. The method of claim 52 further comprises forming the active component in the active region prior to or after forming the cap support.

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54. The method of claim 53 wherein encapsulating the device comprises mounting the cap on the cap support to hermetically seal the device.

15 55. The method of claim 51 further comprises forming the active component in the active region prior to or after forming the cap support.

20 56. The method of claim 55 wherein encapsulating the device comprises mounting the cap on the cap support to hermetically seal the device.